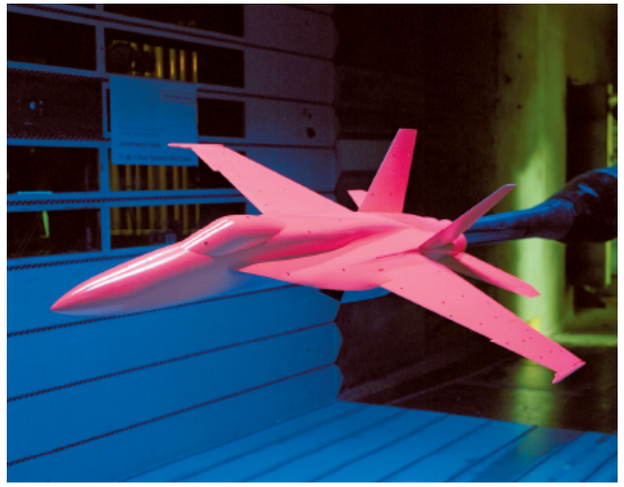

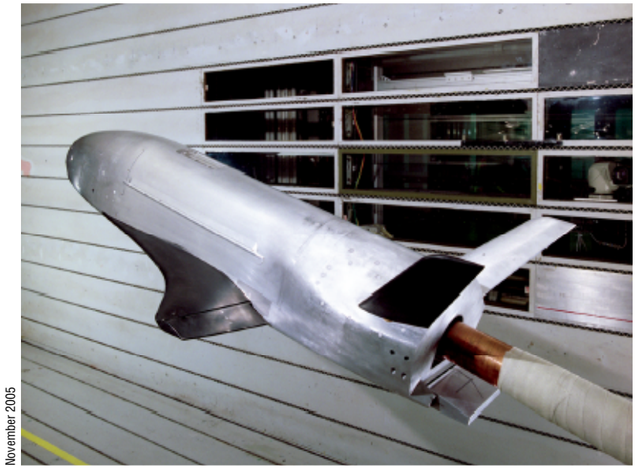

National Aeronautics
and Space Administration

For more information, visit our Web site,
http://windtunnels.arc.nasa.gov
or contact:

Wind Tunnel Division
National Aeronautics and Space Administration
Ames Research Center
Mail Stop: 227-4
Moffett Field, CA 94035
Telephone: (650) 604-1748
Fax: (650) 604-4357

Unitary Plan Wind Tunnel

November 2005

The Unitary Plan Wind Tunnel (UPWT) was completed in 1956 at a cost of $27 million under the Unitary Plan Act of 1949. Since its completion, the UPWT has been the most heavily used NASA wind tunnel. Every major commercial transport and almost every military jet built in the United States over the last 40 years has been tested in this facility. The Mercury, Gemini, and Apollo capsules and the Space Shuttle also were tested in this tunnel complex. The UPWT represents a unique asset of vital importance to the nation's defense and its competitive position in the world aerospace market.

The UPWT includes three test sections: the 11-by-11-foot transonic section, the 9-by-7-foot supersonic section, and the 8-by-7-foot supersonic section. The two supersonic wind tunnels share a common eleven-stage compressor and aftercooler leg and are individually selected through the use of diversion valves. A three-stage compressor drives the 11-by-11-Foot Transonic Wind Tunnel with movable inlet guide vanes for fine Mach number control. A common drive motor system can be coupled to either the three-stage or eleven-stage compressor. Therefore, one tunnel can be run while the other two are in the process of installing or removing test articles.

UPWT

SPECIFICATIONS

11-BY-11-FOOT TRANSONIC SECTION

TYPE . . . . . Closed circuit, variable density, flexible wall nozzle, with a ventilated test section

TEST SECTION DIMENSIONS . . . . . 11 ft by 11 ft by 22 ft

MACH NUMBER RANGE . . . . . 0.20 to 1.5 continuously variable

REYNOLDS NUMBER RANGE . . . . . 0.30 to 9.6 million per foot

STAGNATION PRESSURE . . . . . 3.0 to 32.0 psia

MAXIMUM STAGNATION TEMPERATURE . . . . . 150°F

MODEL SUPPORT SYSTEMS . . . . . Sting mount and turntable

STING MOUNT SUPPORT ANGLE . . . . . ±15.0° in pitch and yaw

TURNTABLE SUPPORT ANGLE . . . . . ±180°

HIGH PRESSURE AIR . . . . . 3000 psia air up to 80 lbm/sec per second supplied to both sting mounted and turntable systems (One megawatt air heater available)

9-BY-7-FOOT SUPERSONIC SECTION

TYPE . . . . . Closed circuit, variable density, asymmetric sliding block nozzle

TEST SECTION DIMENSIONS . . . . . 9 ft by 7 ft by 18 ft

MACH NUMBER RANGE . . . . . 1.55 to 2.6 continuously variable

REYNOLDS NUMBER RANGE . . . . . 0.90 to 6.5 million per foot

STAGNATION PRESSURE . . . . . 4.4 to 29.5 psia

MAXIMUM STAGNATION TEMPERATURE . . . . . 150°F

MODEL SUPPORT SYSTEMS . . . . . Sting mount

STING MOUNT SUPPORT ANGLE . . . . . ±15.0° in pitch and yaw

HIGH PRESSURE AIR . . . . . 3000 psia air up to 80 lbm/sec per second supplied to both sting mounted and turntable systems (One megawatt air heater available)

The 8-by-7-foot supersonic test section is currently not available.

DATA SYSTEMS

Each facility is outfitted with the Standard Data System (SDS). SDS incorporates modern technology in a flexible and modular configuration to satisfy the most demanding steady-state wind tunnel test configurations. Highlights include:

- Calibrations traceable to National Institute of Standards and Technology (NIST) standards.
- Support for all standard steady-state measurements, including temperature, pressure, force, load, position, displacement, and humidity.
- Modular system architecture. Expandable to match customer requirements.
- Standard equations library available to meet most aerodynamic test computational requirements. Full support for test-dependent equations to meet customer requirements.
- Real-time calculations and engineering unit conversions with results instantly available to the user for analysis and diagnostics.
- Capability to allow easy definition of an unlimited number of continuous real-time displays for monitoring measured and computed results. Customers can easily define near-time plots of any parameters in the system using the Display Processor Subsystem (DPS).
- Advanced auto-ranging Flow Measurement Subsystem for acquisition of critical tunnel flow conditions.
- State-of-the-art Transonic Wall Interference Correction System (TWICS) available in the 11-by-11-Foot Transonic Wind Tunnel.
- Support for remote site access, multiple test database access, and advanced instrumentation systems (e.g. Pressure Sensitive Paint).
- Support for conditional sampling for improved data quality.
- Tight integration with the Facility Control System for automated data acquisition resulting in high productivity.

In addition, a test-dependent dynamic data system can be deployed to monitor up to 64 analog sensors. This is useful in monitoring balance dynamics, and other test specific applications.